Title: The Rhythm of Equations

Brief Overview:

In this unit, students will utilize manipulatives and problem solving strategies in order to solve algebraic equations. It begins with concrete concepts through the use of pattern blocks and concludes with more abstract, real-world connections, through writing and solving equations with the amount of syllables in phrases of songs.

NCTM Content Standard/National Science Education Standard:

- Represent the idea of a variable as an unknown quantity using a letter or symbol
- Express mathematical relationships using equations

Grade/Level:

4/5

Duration/Length:

This unit consists of three 90-minute lessons including a culminating assessment.

Student Outcomes:

Students will:

- Identify describe and create equivalent composite figures.
- Identify, write and solve algebraic equations.

Materials and Resources:

Lesson 1
- Pattern Blocks
- Overhead Pattern Blocks
- Cuisenaire Rods
- Overhead Cuisenaire Rods
- Student Resource 1 (one per student)
- Student Resource 2 (one per student)
- Student Resource 3 (one per student)
- Student Resource 4 (one per student)
- Student Resource 5 (one per student)

Lesson 2
- Pattern Blocks
- Chart Paper

- Index cards [10 with four different numbers on them; ten with two different numbers on them (one red, one blue)]
- Student Resource 6 (one per student)
- Student Resource 7 (one per student)
- Student Resource 8 (one per student)
- Student Resource 9 (one per student)
- Teacher Resource 2
- Teacher Resource 3

Lesson 3

- Student Resource 10 (one per student)
- Student Resource 11 (one per student)
- Student Resource 12 (one per student)
- Teacher Resource 4
- Teacher Resource 5
- Teacher Resource 6

Development/Procedures:

Lesson 1

Pre-assessment: Distribute Designing Houses (Student Resource 1)

- **Say:** *There are two houses on this page that are the congruent. Draw shapes inside each house to fill the space. Below it record the shapes and the number of each shape you used.*

Launch –

- **Say:** *Today you will use pattern blocks in order to create composite figures.*
- *Write the phrase* ***composite figure*** *on the board.*
- **Say:** *Look at the houses you've created.*
- **Ask:** *Were you able to completely fill the houses in a different way?* Yes
- Have students share their houses with other members of their tables. Allow time for them to discuss the various ways they completed their houses.
- Ask for approximately 4-6 students to stand in front of the class and share their houses.
- **Ask:** *What can you tell me about these houses? How are they different? How are they the same?* (Accept all possible answers) Allow students to return to their seats.
- **Ask:** *Did you notice that the outline shape of the house remained congruent?* Yes
- **Say:** *This is an example of a composite figure.*
- On the board write and explain that a composite figure is a shape made from smaller shapes.

Teacher Facilitation –

- Place overhead pattern blocks on the overhead projector.
- **Model** for student how many triangles are in a rhombus by placing a rhombus on the overhead then placing two triangles on top of the rhombus.
- **Say:** *I have just made a composite figure of a rhombus because these two triangles create the same shape of the rhombus.*
- Now, place a trapezoid on the overhead and **model** a prediction of how many triangles it would take to completely fill the trapezoid.
- **Say:** *I can predict that it will take three triangles to completely fill this trapezoid because it took two triangles to fill the rhombus and I think one more triangle added to that will make a trapezoid.*
- Place three triangles on top of the trapezoid to show that your prediction was correct.
- Distribute a bag of pattern blocks to each student. Each bag should have two hexagons, five trapezoids, six rhombuses and eight triangles.
- **Say:** *Now we will create composite figures using more shapes. Everyone place a hexagon on your desk. In your journal, make a prediction of how many triangles you think it would take to completely cover the hexagon shape based on what you already know.* 6 (Allow one minute for students to record their predictions). Volunteer responses and explanations and record them on the board.
- **Say:** *Now, place the triangles on the hexagon to check your predictions.*
- **Ask:** Were *your predictions correct? Turn and talk with someone at your table or group about what you discovered.* (Allow two minutes for students to discuss. Then ask for a few volunteers to share what they learned. (Sample responses: I knew that it would take six triangles to completely fill the hexagon because it took three to cover the trapezoid and I know that the hexagon is twice the size of a trapezoid. I thought it would take five triangles to completely fill the hexagon because it was bigger than the trapezoid that took three triangles to fill it (Accept all possible responses).
- **Say:** *Now we are going to begin with a composite figure and see what other composite figure will completely fill it. Place a rhombus and a trapezoid on your desk side by side and look at it carefully. Write a prediction in your journal of how many triangles it would take to make a congruent shape.* (Allow one minute for student responses in their journals).
- **Say:** *Now place the triangles on top of your composite figure to check your prediction.*
- **Ask:** *Was your prediction correct? Turn and talk with someone at your table to discuss your findings.* (Allow two minutes for students to discuss their results).
- **Ask:** *Are there any other shapes you could have used to make a composite figure other than only triangles?* Yes

- **Say:** *Explore with other shapes and record your findings in your journal.* (Sample Responses: I found that I could use two rhombuses and one triangle. I found that I could use one rhombus and three triangles)
- **Say***: So we can say that one trapezoid and one rhombus is equal to two rhombuses and one triangle. We can also say that two rhombuses and one triangle is equal to one rhombus and three triangles. We know they are equal because they are congruent.*
- Write the definition of equality on the board. (Equality: the relationship between two objects that are equal in value)
- Answer questions and provide further explanation if needed.
- Collect pattern blocks.

Student Application –

- Distribute Pattern Blocks Cut Outs (Student Resource 2) and CD Cover Worksheet (Student Resource 3)
- Explain to students that a record producer has asked them to design Bow Wow's new CD Cover. Bow Wow would like the cover to be completely covered with trapezoids, triangles, hexagons or rhombuses. Design two CD covers by completely creating two different composite figures. Below each cover list the shapes and amount that you used. Then on the lines provided at the bottom of the worksheet, explain how the two CD covers are equivalent even though they were made up of two different designs.
- As students are working, circulate throughout the classroom and assist students when needed.
- Allow students fifteen to twenty minutes to complete this activity.
- After students have completed their assignment, have them share and describe their work. Discuss the various composite figures used to complete the CD cover.
- Check to make sure students have created composite figures that are congruent to the original shape (Answers may vary depending on the number of shapes used).

Embedded Assessment – BCR: (Student Resource 4 and Student Resource 5) (Teacher Resource 1)

- **Say: Part A:** Jay-Z was so impressed by your CD cover you designed for Bow Wow that he asked you to design his as well. Based on the shapes below, create two composite figures for Jay-Z to choose from.
- **Part B:** Explain how your CD covers are congruent. Use what you know about composite figures to explain why your answer is correct. Use letters, numbers and/or symbols in your explanation.

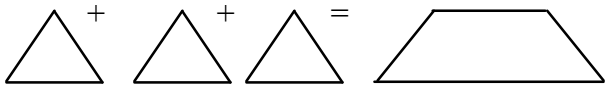
Reteaching/Extension –

- Use Cuisenaire Rods to demonstrate equivalence. Have students use the Cuisenaire Rods to create equivalent length using various sizes of rods. Students can explore and record their findings on an index card by

drawing and coloring what they have created with the rods onto the index card.

Lesson 2

Pre-assessment: Write the following questions on the board or on chart paper. Have students answer on slates or index cards**: How many triangles does it take to make one trapezoid?** [3] **How do you know?** [It takes three triangles to completely cover a trapezoid] **Draw a diagram using the triangle, trapezoid and the equal sign.**

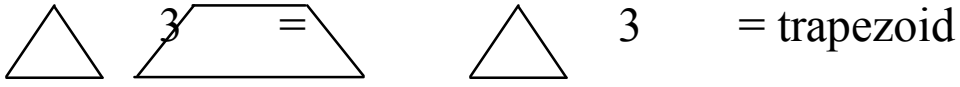


Launch – Distribute pattern blocks, (Each student should have at least six triangles, at least six rhombuses, at least six trapezoids, and at least three hexagons).

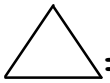
- **Say:** *Yesterday in math we learned that you could use pictures to represent equality. In math we use a lot of different things to represent equality. Today we are going to use pattern blocks and numbers to show equality using algebraic equations.*
- Display the correct answer to the pre-assessment on chart paper or the overhead. (See above)
- **Say:** *How are we able to use the equal sign, even though there are no numbers in our answer? How do we actually know that three triangles equal one trapezoid?* (The equal sign represents balance, and we know that the shapes are equal because they are congruent, they are the same size and the same shape]).
- **Say:** *When we see the equal sign we are going to think BALANCE.*

Teacher Facilitation –

- **Ask:** *What if I was trying to decide what number to give each shape? Which shape do you think would be equal to one? Why?* (The triangle would be equal to one because it is the smallest shape) *If the triangle were equal to one, then what would be equal to two? Why?* (Rhombus, because it takes two triangles to equal one rhombus]) *Tell your partner the shape you predict will be equal to three? Explain your prediction.* (The trapezoid because there are three triangles in a trapezoid) *If a triangle is equal to one, will we have a shape equal to four or five?* (No) *Why not?* (Four or five triangles are not congruent to any other shape in our group of shapes])
- **Say:** *Today we are going to learn about equations. We can use our problem of the day (pre-assessment) and turn it into an equation. Can anyone tell me how to do that?* Draw the following diagram on chart paper or the overhead.



- ***Say****: Looking at our diagram now, can anyone tell me the attributes of an equation?* Solicit student responses (numbers, variables, operation, and equal sign).
- **Define the following four terms and place on word wall for future use.**
  Variable: to a letter or symbol representing such a quantity.
  Operation: addition, subtraction, multiplication, division
  Equal sign: shows a relationship of balance on both sides of the sign
- Distribute construction paper or a piece of unlined paper for students to use as a work mat. Have students fold paper in half twice to make four equal size squares.
- **Say:** *We already decided that one triangle was equal to the number one. But, what if I said it is no longer equal to one and instead it is equal to three. Show on your work mat*  **= 3.** Using what we know about the relationship between the shapes, we could draw a diagram showing what the rhombus is now equal to.
- Display: 
- Rhombus= 2*triangle or Rhombus = 3+3
- Point to display. Ask: *This is my diagram, how can I turn my diagram into an equation. What is it missing*? (A variable) *Let's use the first letter of the color of the shapes to represent the actual shape, so we will make it our variable. For example, what color is the triangle?* (Green Triangle= G); *What color is Trapezoid?* (Red Trapezoid = R) What color is Rhombus? (Blue Rhombus =B) and *What color is Hexagon*? (Yellow Hexagon= Y).
- Say: *Now let's turn our diagram into an equation. We want the triangle to continue to equal 5 so T=5. So if we want to find out what rhombus is equal to, we could write:* T x 2= R or 5 x 2 = R. *Let's check to make sure this is an equation. What are the variables in the equation T x 2= R* (T and R) *What is the operation? (Multiplication) What are the numbers*? (2 and/or 5) *Do we have an equal sign?* (Yes).
- Say: *On your work mat please show*: 8+G = 12. Show using pattern blocks.

  8 +  **=12**

  What number can we substitute for the G? What does the G =? (4) How do you know? (Because the only number that you can insert to make both sides equal or balanced is 4).
- Say: *I want you to take the eight away and substitute it with a symbol or a variable, what can you predict I will replace it with? Explain your prediction*. (B or a rhombus, because the rhombus is twice the size of the triangle)
- Make sure students understand the meaning of the word substitute here. Put the word **Substitute** on the word wall. Substitute is replacing a

variable with a value. **Variables** stand for some value. Reiterate that substitution is the same as replacing, and you are just substituting the symbol or letter for a value.

Student Application – Students will complete Student Resource 6,Variables.

- **Say:** *Now you will complete an activity sheet that is going to require you to read a key and then replace variables with numbers and numbers with variables. Make sure you read the key so that you can determine the worth of each variable. The values of the pattern blocks are set in proportion to one another, so if triangle is equal to 3 then rhombus is equal to 6.*
- Students will need to replace variables with numbers to show equality. Circulate the room offering assistance when needed. Encourage students to use the pattern block manipulatives to determine proportion and equivalence.
- See Teacher Resource 2,Variables, for the answer sheet.

Embedded Assessment – Distribute *Student Resource 07* BCR-Where Are Our Blocks?

- Tell students they are going to create equations to help them solve a word problem.
- **Read:** Marissa, Kevin, Jamal, and Tashena were playing with their pattern blocks before they went to the Bow Wow concert. Marissa's little sister played with their blocks while they were gone. When they returned to collect their blocks Jamal noticed they were missing 4 blocks.

Have students read the clues to themselves.

- **Ask:** Are there any people who we are sure how many blocks they started with? (Yes. Marissa started with 7).
- **Say:** Ok. Then M=7. Use this expression to help you solve the problem. Do not forget to show all of your work, and explain how you know your answer is correct. Teacher Resource 3-Where Are Our Blocks? Is the answer sheet?

Reteaching/Extension –

For students who have mastered the skill of equations and expressions, but need more help with variables, distribute *Student Resource 08 – Pan Balance Expressions*

- Prepare about 10 index cards with four numbers on each. Students will take an index card and participate in the online activity Pan Balance Expressions available through the National Teachers of Mathematics worksite at: http://illuminations.nctm.org/ActivityDetail.aspx?ID=10
- The goal of the activity is for students to be able to arrange the four numbers to come up with as many equivalent expressions as they can. Any of the four numbers can be X. Students can only use the numbers on the card. However, they may use they as many times as they need. The

students will write expressions, and then enter the expressions on the scale. If the expressions are equivalent, they will right EQUAL VALUE. If not, they will write INEQUAL VALUE.

For students who need more assistance with expressions and equality, distribute *Student Resource 9 Pan Balance Numbers.*

- Give students index cards with two numbers, one number in a red marker and one number in a blue marker. Students will participate in the online activity Pan Balance Numbers available through the National Teachers of Mathematics worksite at: http://illuminations.nctm.org/ActivityDetail.aspx?ID=26
- The goal of this activity is for students to be able to understand the equal sign as a relationship as opposed as to an operation or "the answer to". Students will put the red number on the red side of the balance and the blue number on the blue side of the balance. They will then need to create an expression on both sides that will balance. The goal is for them to come up with as many different balanced equations as they can.

Lesson 3

Pre-assessment

- **Say:** How many syllables are in this question? 11
- **Say:** Write another sentence that has the same number of syllables as the previous question (Students' sentences should have 11 syllables).
- Ask a few volunteers to read their sentences to the class. Record the sentences on the board.
- **Ask:** Do all of these sentences have eleven syllables? Yes

Launch

- **Say:** Today we will be using syllables in words to write and solve algebraic equations.
- **Say:** Yesterday, we discussed what an algebraic equation was.
- **Ask:** Can someone refresh my memory of what an algebraic equation is? (Acceptable responses: An algebraic equation is like a number sentence because it includes numbers, an operation, and an equal sign. But an algebraic equation also has a variable). If students do not respond with similar answers, remind them to revisit the word wall before providing them with the answer.

Teacher Facilitation

- Write the following equation on the board. **6 + Y = 12**
- **Ask:** Is this an algebraic equation. Yes Why? (Suggested answer: Because it has a number, operation, variable and an equal sign).

- **Ask:** How would I solve this equation? (Suggested responses: find the missing number, use inverse operations, count backwards or count up from six until you get to twelve.)
- **Say:** Now, look at this sentence. **B + love + B = 3 syllables.**
- **Ask:** Is this an algebraic equation? Yes Why? (Suggested answer: Because it has a number, operation, variable and an equal sign).
- **Ask:** Would I be able to solve this equation the same way as the previous equation? (Yes, you could count the number of syllables to find out how many are missing.)

- **(Think Aloud) Say:** I am going to try to solve this equation. B + love + B = 3 syllables. Well, I will start with what I already know. I know that the word *love* has one syllable, so I can substitute the number one for love in this equation like this.

B + love + B = 3 syllables
B + 1 + B = 3 syllables

- **Say:** Now I also know that the variable B in this equation stands for the same number because B=B. I can count up from the number one until I stop at three in order to determine what B equals. So, B = 1 because I counted up to two and I know that 1 + 1 = 2. Now, if I return to my original equation I can rewrite it with one-syllable words instead of variables and complete the sentence. **I + love + you = 3 syllables**
- **Ask:** Is this the only possible sentence I could have written? No
- **Say:** Tell me other possibilities. (You love me. Accept all responses that are complete sentences with two-one syllable words.)

Student Application

- **Say:** Now we are going to try to write and solve more equations.
- Write on the board: X + are + family = 5 syllables
- **Ask:** In order for us to solve this equation, what should we do first? (Possible answer: First I would count how many syllables are in the words, *are and family, and* then subtract it by 5 to see how many more syllables I still need.
- Write on the board below the equation, X + 1 + 3 = 5 syllables, 1+ 3 = 4, and 5 – 4 = 1 so, X = 1
- **Ask: W**hat would you do to solve the equation? (Possible answer: I would think of a one-syllable word to complete the phrase.)
- Write on the board, 1 + are + family = 5 syllables, so We + are + family = 5 syllables.
- **Say:** Now let's look at how you can write your own equation from a phrase.
- Write on the board, Lift + c + voice + and + sing = 6 syllables.
- How can we write this phrase from a song as an equation? (Possible answer: We need an operation, variables, numbers and an equal sign. The

C is the variable. Each word value can be assigned based on its number of syllables and the operation is addition.)

- Write on the board, 1 + c + 1 + 1 + 1 = 6.
- **Ask:** How do we solve for c? (Possible answer: Add all the ones and subtract the sum from six.
- Write on the board, 1 + 1 + 1 + 1 = 4, and 6 – 4 = 2 so, c = 2
- Take a few minutes to answer questions and provide further explanation if needed.
- Distribute Lyrical Equations worksheet (Student Resource 10)

Embedded Assessment

- Distribute All Mixed up (Student Resource 11)
- Read: *The equations below represent the formula for a famous Langston Hughes poem. The poem is mixed up at the bottom of the page. You have to rewrite the poem in the correct order using the equations as a guide. The equations tell you the number of syllables in each word. Write the poem in the correct order in your Math notebooks. Be sure to check your work by making sure each line matches the equation.*

- This form has the students doing a similar activity except now they are solving for one variable, and they have to match equations with lines of poetry. The poem is mixed up. The lines are divided in syllables. Students have to put the poem in the correct order. See Teacher Resource 5 for the correct answer.

Reteaching/Extension

Students will play online games.

- Students will have to evaluate an Expression with One Variable

http://www.aaaknow.com/equ725x3.htm

- At this website, students will print off a game sheet. They will also need a number cube.

http://www.bbc.co.uk/education/mathsfile/printoffs/dice1a.html

Summative Assessment:

The Summative Assessment for this unit is an extended constructed response, Student Resource 12- Writing and Solving a Math Song.

The students will have to write a song or poem using mathematical terms from the unit. The students will then have to convert their poem or songs into equations and write the total value of their song or poem. Students will list the variable and its value as an equation. Students will then explain how they determined the value of their song or poem, and how they developed their equations. Refer to Teacher Resource 6 for the MSA Extended Constructive Response Rubric.

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Brief Constructed Response

Jay-Z was so impressed by your CD cover design for Bow Wow that he has asked you to design his as well.

Step A

Use the shapes on the back of this page to create two composite figures for Jay-Z to choose from.

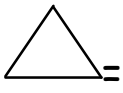
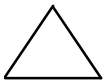
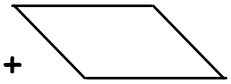
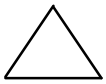
Step B

Explain how your CD covers are equal to each other. Use what you know about composite figures to explain why your answer is correct. Use words and/or numbers in your explanation.

Student answer may vary depending on the types of shapes they used and how many, however, students should include the number of shapes it takes completely cover another and explain how they are equal to one another.

Variables

Directions: Rewrite each equation as a number sentence and solve.

(a)If  = 7 then  +  + 

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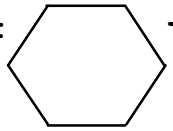
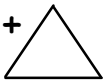
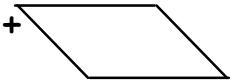
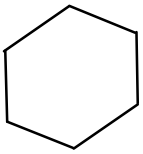
(b)If 18=  then  +  +  + 

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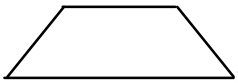
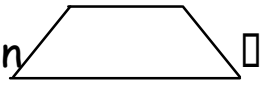
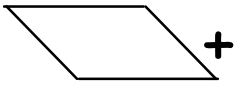
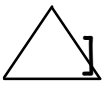
(c)If  = 36 then  [ + ]

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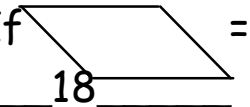
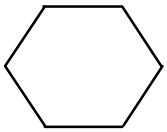
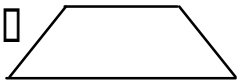
(d)If  = 12 then  

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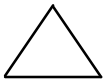
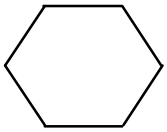
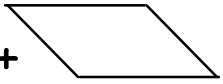
(e) If  = 5 then  X  + 

=____460_____

(f) Complete the equations below using the following key:

2 x G= 14 G=__7____ 36+ Y= 56-12 Y=__8_____

25 ÷5=36-B B=_31___ 13+H = 18- 3 H=____2____

(g) Solve for each variable. Q= Quarter D=Dime N= Nickel P=Penny

$5.35-[2Q * 5N] + 17 P= ____$4.77_____

$.98 * 2 + [7Q+6D] = _____$3.31_____

(h) In your own words, explain the meaning of a variable. Give an example.

A variable is a letter or symbol that stands for a value. So Q can be a variable for 25 cents.

Where Are Our Blocks?

Marissa, Kevin, Jamal, and Tashena were playing with their pattern blocks before they went to the Bow Wow concert. Marissa's little sister played with their blocks while they were gone. When they returned to collect their blocks Jamal noticed they were missing 4 blocks.

Step A

Use the following clues to determine the number of blocks the friends started with. SHOW YOUR WORK!!!

Marissa started with 7 blocks.
Kevin had five more blocks than Marissa.
Jamal had two times as many blocks as Kevin.
Tashena had one less block than Jamal.

Possible Answer:

M=7
K=5+m=12
J=K*2=24
T=J-1=23
23+24+12+7= 66
66+4= 70

Correct answer is 70

Step B

Use what you know about equations to explain why your answer is correct. Use words and/or numbers in your explanation.

Sample answer: I used letters to represent each person's name. I knew Marissa has 7 and the clue said Kevin had five more blocks than Marrisa. I knew that five more here meant to add five, so I did K=5+7 and I got 12. Accept any answers that explain the use of their operations and variables.

Lyrical Equations

Directions: Help!! Some musical artists have to change some of their lyrics. Below are equations that make up syllables to their songs. Solve the equation and then write a word that would complete the phrase. Solve for X or Y in each equation.

1. It + goes + one + by + one + X + two + by + two = 10 syllables

Equation: 1 + 1 + 1 + 1 + 1 + X + 1 + 1 + 1 + 1 = 10, 9 + X = 10

X = 1 New word (Sample answer: even)

2. Y+on+the+floor+let+me+show+you+how+we+do = 14 syllables

Equation: Y + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 14, Y + 10 = 14

Y= 4 New Word (Sample Answer: everybody)

3. Me + X + 1 + 1 = 5 syllables

Equation: 1 + X + 1 + 1 = 5, 3 + X = 5

X= 2 New phrase (Sample Answer: Me, myself and I0

4. That's + all + I + Y + in + the + Y = 7 syllables

Equation: 1 + 1 + 1 + y + 1 + 1 + y = 7, 5 + y + y = 7

Y= 1 New Phrase (Sample Answer: That's all I got in the end)

5. X + look + both + ways + X + you + cross + me = 10 syllables

Equation: X + 1 + 1 + 1 + X + 1 + 1 + 1 = 10, 6 + X + X = 10

X= 2 New Phrase (Sample Answer: Darling, look both ways before you cross me.

All Mixed Up!

The equations below represent the formula for a famous Langston Hughes poem. The poem is mixed up at the bottom of the page. You have to rewrite the poem in the correct order using the equations as a guide. The equations tell you the number of syllables in each word. Write the poem in the correct order in your Math notebooks. Be sure to check your work by making sure each line matches the equation.

LINE 1: 1+A+1+1+1+A=8 A=___2_____
LINE 2: 1+1+B+1=4 B=___1_____
LINE 3: 1+1+C+1+1+1=7 C=__2_____
LINE 4: 1+D+1+1+1=6 D=__2_____
LINE 5: 1+E+1=3 E=__1_____
LINE 6: 1+1+1+1+F+1=7 F=__2_____
LINE 7: 1+1+1+G+G=7 G=__2_____
LINE 8: 1+1+H+1=6 H=__3_____
LINE 9: I+1+1+1=5 I=___2_____
LINE 10: 1+1+J+1=5 J=___2_____
LINE 11: 1+1+1+K=5 K=___2_____

What happens to a dream deferred?

Does it dry up
like a raisin in the sun?
Or fester like a sore--
And then run?
Does it stink like rotten meat?
Or crust and sugar over--
like a syrupy sweet?

Maybe it just sags
like a heavy load.

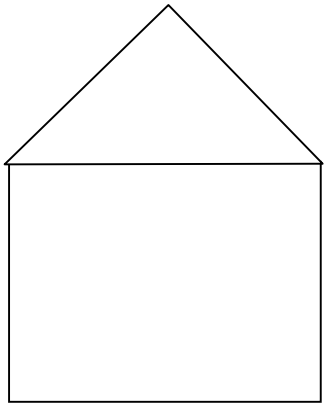
Or does it explode?

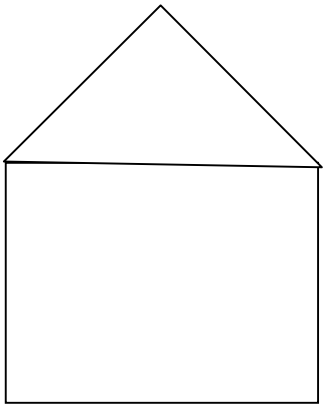
Rubric for National Math Song Contest
MSA Extended Constructive Response

Score	
3	**My answer shows I completely understood the problem and how I solved it:** • **I used a very good, complete strategy to correctly solve the problem.** • **I used my best math vocabulary to clearly explain what I did to solve the problem. My explanation was complete, well-organized and logical.** • **I applied what I know about math to correctly solve the problem.** • **I used numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem.**
2	**My answer shows I understood most of the problem and how I solved it:** • **I used a good strategy to solve the problem.** • **I used math vocabulary and my explanation was mostly complete, well-organized and logical.** • **I was able to apply some of what I know about math to solve the problem.** • **I tried to use some numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem.**
1	**My answer shows I knew only a little about the problem and how I solved it:** • **I used only part of a good strategy to solve the problem.** • **I needed to use better math vocabulary and my explanation needed to be more complete, organized or more logical.** • **I needed to apply more about what I know about math to solve the problem.** • **I tried to use some numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem, but I may not have been correct in what I used.**
0	**My answer shows I didn't understand the problem and how I solved it:** • **I didn't use a good strategy to solve the problem.** • **My strategy wasn't related to what was asked.** • **I didn't apply what I know about math to solve the problem.** • **I left the answer blank.**

Designing Houses

Directions: Draw shapes inside each house. Make sure your houses are completely differently.





On the lines below, list each shape you used and how many of each.

House A

_____

_____

_____

_____

House B

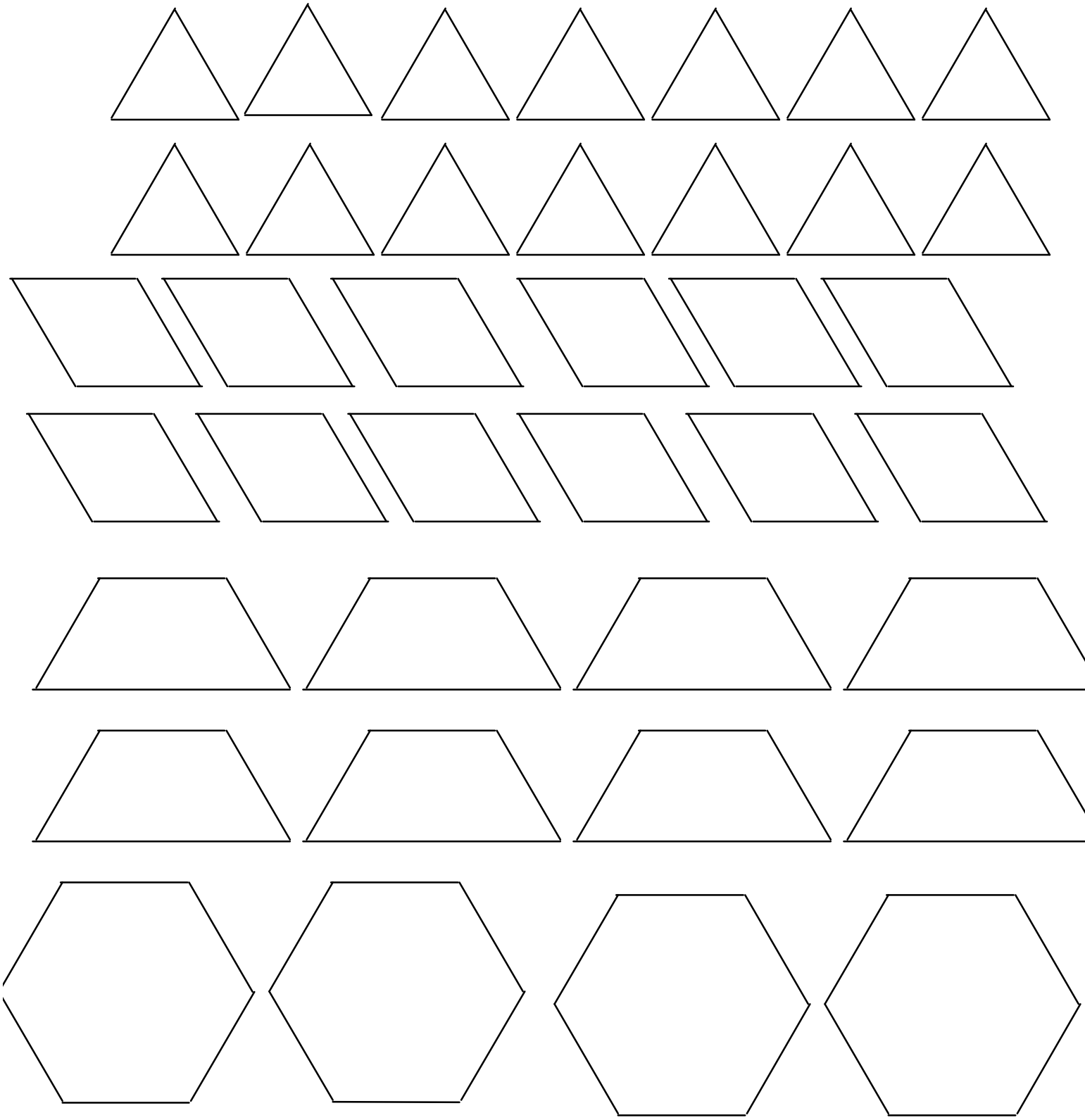
_____

_____

_____

_____

Pattern Blocks Cut Outs

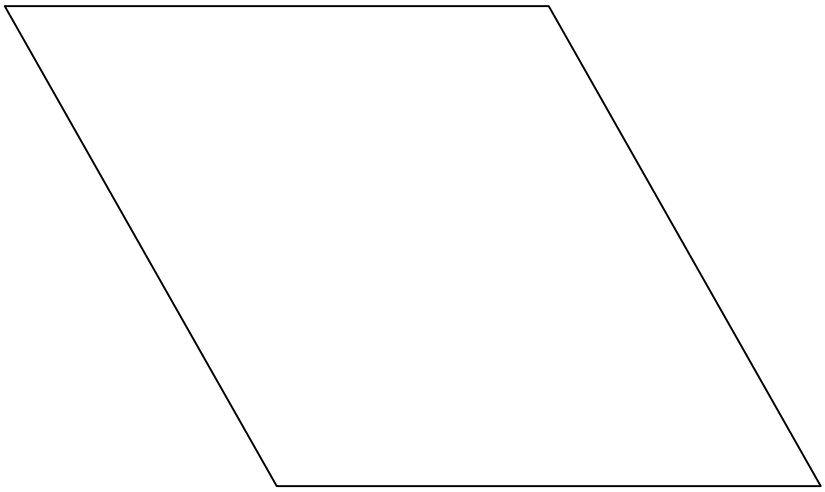


Name _____ Date _____

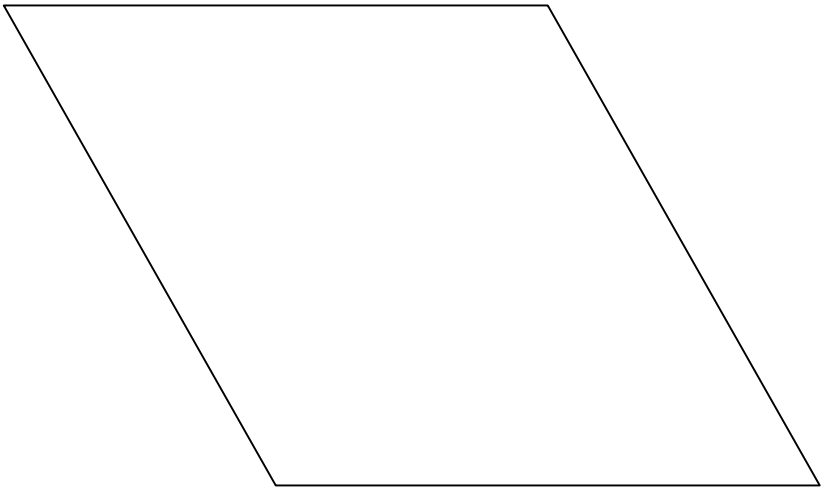
Designing CD Covers

Directions: Use the pattern block cut outs to cut and paste onto each CD cover to create a design. Remember to cover the CD completely.

CD Cover 1



CD Cover 2



Brief Constructed Response

Jay-Z was so impressed by your CD cover design for Bow Wow that he has asked you to design his as well.

Step A

Use the shapes on the back of this page to create two composite figures for Jay-Z to choose from.

Step B

Explain how your CD covers are equal to each other. Use what you know about composite figures to explain why your answer is correct. Use words and/or numbers in your explanation.

_____

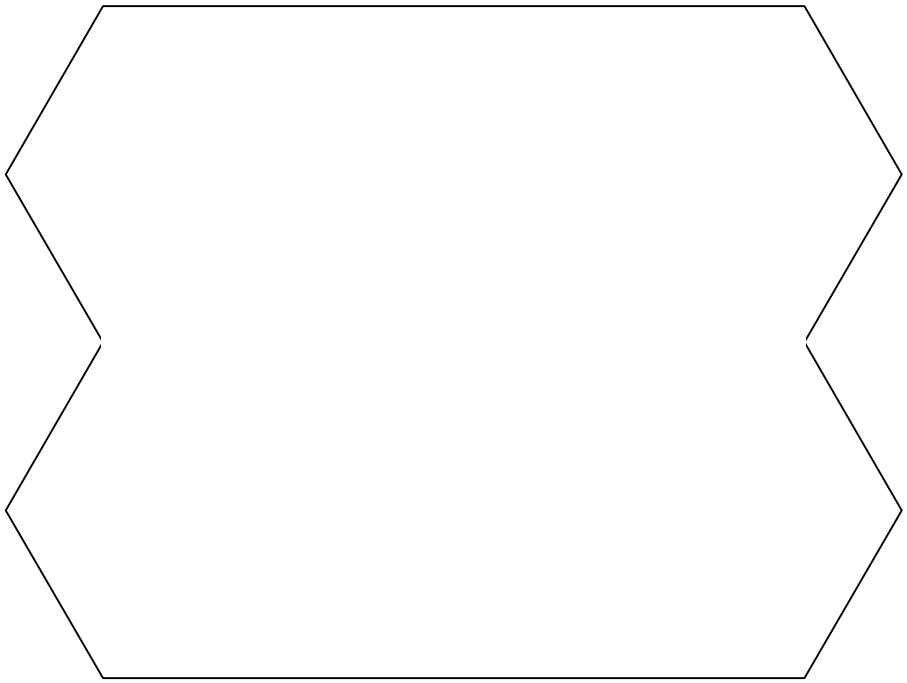
_____

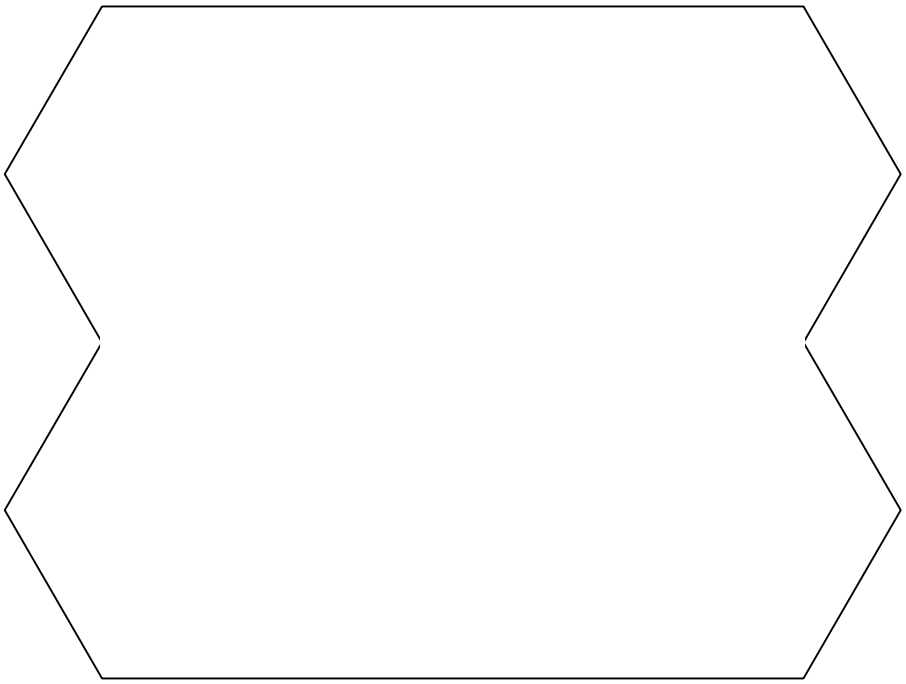
_____

_____

_____

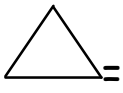
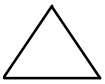
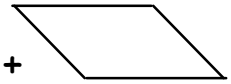
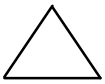
Student Resource 5

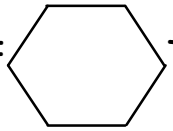
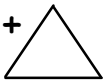
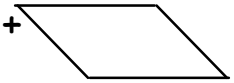
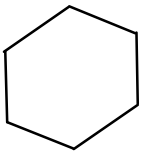




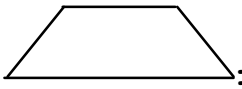
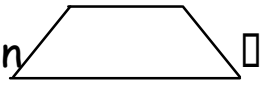
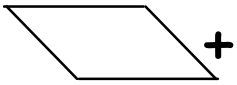
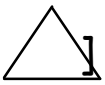
Variables

Directions: Rewrite each equation as a number sentence and solve.

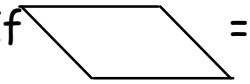
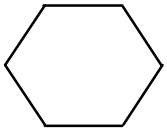
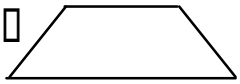
(a)If  = 7 then  +  +  =_____

(b)If 18=  then  +  +  + 

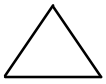
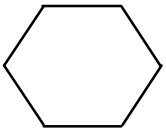
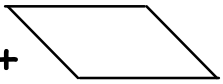
=_____

(c)If  = 36 then  [ + ]

=_____

(d)If  = 12 then  

=_____

(e) If  = 5 then  X  + 

=_____

(f) Complete the equations below using the following key:

2 x G= 14 G=_____ 36+ Y= 56-12 Y=_____

25 ÷5=36-B B=_____ 13+H = 18- 3 H=_____

(g) Solve for each variable. Q= Quarter D=Dime N= Nickel P=Penny

$5.35-[2Q * 5N] + 17 P= _____

$.98 * 2 + [7Q+6D] = _____

(h) In your own words, explain the meaning of a variable. Give an example.

_____

_____

Where Are Our Blocks?

Marissa, Kevin, Jamal, and Tashena were playing with their pattern blocks before they went to the Bow Wow concert. Marissa's little sister played with their blocks while they were gone. When they returned to collect their blocks Jamal noticed they were missing 4 blocks.

Step A

Use the following clues to determine the number of blocks the friends started with. SHOW YOUR WORK!!!

Marissa started with 7 blocks.
Kevin had five more blocks than Marissa.
Jamal had two times as many blocks as Kevin.
Tashena had one less block than Jamal.

Step B

Use what you know about equations to explain why your answer is correct. Use words and/or numbers in your explanation.

Pan Balance Expressions

- Go online to: http://illuminations.nctm.org/ActivityDetail.aspx?ID=10
- Read the instructions on the activity page.
- Take three index cards that have four numbers on them. You will make six attempts for every card before you begin a new card.
- List your four numbers in the first column.
- Pick a value for X and list it in the second column.
- Fill in the balance beam with an expression, and list that expression under the third column. If the scale balances with the expressions are equivalent.
- Write EQUALITY if the expressions are equal and INEQUALITY if they are not, in the fourth column.

Four Numbers I Started With	Value of the X	Equations I Attempted	Equality or Inequality?

Pan Balance Numbers

- Go online to: http://illuminations.nctm.org/ActivityDetail.aspx?ID=26
- Read the instructions on the activity page.
- Take three index cards that have two numbers on them. You will make six attempts for every card before you begin a new card.
- List your two numbers in the first column
- Place the red number on the red side of the balance and the blue number on the blue side of the balance.
- Look at your target number. Think: What can I do to both of these numbers to get to my target number?
- Think of six different expressions you can use to get to your target number and enter them on the scale. Try to use different operations.
- If they are equal the scales will balance, if the scale balances write Equality, if not write Inequality

Two Numbers I Started With	Target Number	Equations I Attempted	Equality or Inequality?
	35		
	94		

Lyrical Equations

Directions: Help!! Some musical artists have to change some of their lyrics. Below are equations that make up syllables to their songs. Solve the equation then write a word that would complete the phrase. Solve for X or Y in each equation.

6. It + goes + one + by + one + X + two + by + two = 10 syllables

Equation: _____

X = _____ New word _____

7. Y+on+the+floor+let+me+show+you+how+we+do = 14 syllables

Equation: _____

Y= _____ New Word _____

Me + X + 1 + 1 = 5 syllables

Equation: _____

X= _____ New phrase _____

8. That's + all + I + Y + in + the + Y = 7 syllables

Equation: _____

Y= _____New Phrase _____

9. X + look + both + ways + X + you + cross + me = 10 syllables

Equation: _____

X= _____ New Phrase _____

All Mixed Up!

The equations below represent the formula for a famous Langston Hughes poem. The poem is mixed up at the bottom of the page. You have to rewrite the poem in the correct order using the equations as a guide. The equations tell you the number of syllables in each word. Write the poem in the correct order in your Math notebooks. Be sure to check your work by making sure each line matches the equation.

LINE 1: 1+A+1+1+1+A=8 A=_____

LINE 2: 1+1+B+1=4 B=_____

LINE 3: 1+1+C+1+1+1=7 C=_____

LINE 4: 1+D+1+1+1=6 D=_____

LINE 5: 1+E+1=3 E=_____

LINE 6: 1+1+1+1+F+1=7 F=_____

LINE 7: 1+1+1+G+G=7 G=_____

LINE 8: 1+1+H+1=6 H=_____

LINE 9: I+1+1+1=5 I=_____

LINE 10: 1+1+J+1=5 J=_____

LINE 11: 1+1+1+K=5 K=_____

like a raisin in the sun?
like a syrupy sweet?
Or fester like a sore—
Or crust and sugar over
Does it dry up?
Does it stink like rotten meat?
Or does it explode?
What happens to a dream deferred?
like a heavy load
And then run?
Maybe it just sags

Student Resource 12

Writing and Solving a Math Song (Two Pages)

The National Songwriting Corporation is having trouble coming up with songs that correctly uses mathematical terms, so they are sponsoring a songwriting contest. The National Math Songwriter contest is this Friday.

Part A *Write a song or poem using and defining mathematical terms. You must include math terms in your song or poem and use them correctly. Some words you can use are: equations, equality, balance, variable, operations, composite figures, etc. Your song or poem must have at least fifteen words, but not more than thirty words. At least five of those words must be mathematical terms.*

Part B

- *Thinking about the words of your song or poem as syllables, rewrite the words of your song or poem as an equation. Make one variable equal the same thing throughout your song. On the line below write the total value of your song or poem, and your variable and its value as an equation. Then explain how you determined the value of your song or poem, and how you developed your equation.*